SHORTER VERSUS LONGER RECOVERY PERIODS BETWEEN KNOCKOUT RACES IN SPRINT CROSS-COUNTRY SKIING

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Introduction

The recovery durations between races in a sprint cross-country (XC) ski competition are irregular (Losnegard et al., 2015; Stöggl et al., 2007). Moreover, the level of accumulated fatigue experienced by athletes during a XC ski competition is affected by the durations of these recovery periods (Vesterinen et al., 2009; Zory et al., 2006).

Objectives

The aim of this study was to compare the physiological and performance effects of longer versus shorter recovery periods between the three knockout races of a simulated sprint XC ski competition, as would be experienced in a real-world setting (Fig. 1).

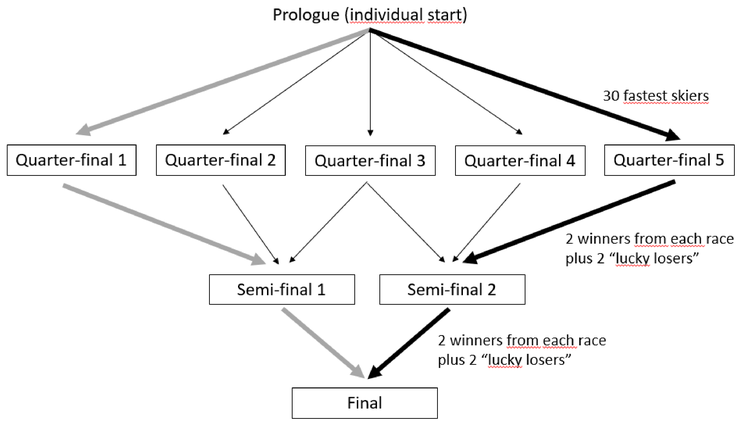

Fig. 1. A schematic of the different pathways through a real-world cross-country sprint competition

Materials & Methods

Eleven well-trained XC skiers completed two simulated sprint XC ski competitions on a treadmill involving four 883-m roller-ski bouts at a 4° incline using the gear 3 skating technique. The four bouts were used to reflect the prologue (P), quarter-final (QF), semi-final (SF) and final (F). The first three bouts (P, QF and SF) were completed at a fixed speed corresponding to 95.6% of each individual's pre-determined maximal sprint effort. The final bout (F) was performed as a maximal, self-paced time trial. Test conditions differed by the time durations prescribed between the QF, SF and F, which simulated real-world competition conditions using maximum (MAX-REC; heavy grey arrows in Fig. 1) or minimum (MIN-REC; heavy black arrows in Fig. 1) recovery durations.

Results

The F was completed in a significantly faster time during MAX-REC compared to MIN-REC (179.2 ± 18.1 s *vs.* 184.6 ± 20.0 s; P=0.009; Fig. 2) and power output was also greater during MAX-REC compared to MIN-REC (4.61 ± 0.44 W·kg^{-1} *vs.* 4.48 ± 0.47 W·kg^{-1}; P=0.010).

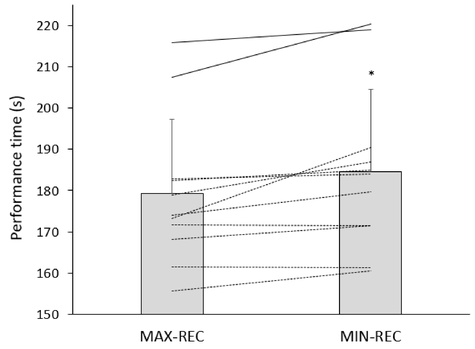

Fig. 2. Time taken to complete the final (F) following longer (MAX-REC) vs. shorter (MIN-REC) recovery periods

Analyses of the pacing profiles during the F showed a *tendency* for power output to be maintained to a greater extent over the first three quartiles during MAX-REC compared to MIN-REC (Fig. 3). There were no significant differences in physiological responses during F in the two test conditions (P>0.005), but there was a *tendency* for the anaerobic metabolic rate, peak HR, peak blood lactate concentration and peak RPE to be higher during the SF in MIN-REC *vs.* MAX-REC.

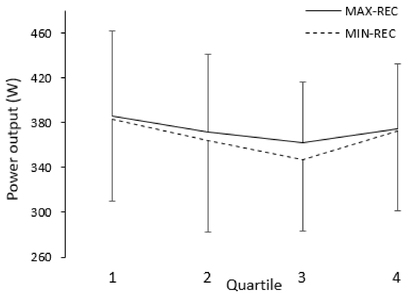

Fig. 3. Power output during the four quartiles of the final (F) during MAX-REC and MIN-REC

Conclusions & Practical Applications

- Maximizing recovery between the knockout races of a sprint XC ski competition is beneficial to performance in the final.
- This may be due to reduced physiological perturbations during the preceding race, resulting from greater recovery time between the QF and SF.
- These findings have implications for the tactical choices made by skiers when selecting their sprint heats.

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